HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Garrison Springs Fall Chinook Fingerling Program
Species or Hatchery Stock:	Fall Chinook (Onchorynchus tshawytscha) Chambers Creek (Garrison Springs)
Agency/Operator:	Washington Department of Fish and Wildlife
Watershed and Region:	Chambers Creek Puget Sound
Date Submitted:	, 2002
Date Last Updated:	August 20, 2002

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Garrison Springs Fingerling Fall Chinook Program

1.2) Species and population (or stock) under propagation, and ESA status.

Chambers Creek Fall Chinook (*Oncorhynchus tshawytscha*)

1.3) Responsible organization and individuals

Name (and title):	Manuel Farinas, Operations Manager Rich Eltrich, Complex Manager	
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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:

In addition to WDFW's Garrison Springs production, 500 eyed eggs are given to a local school.

1.4) Funding source, staffing level, and annual hatchery program operational costs.

This program is funded through the State General Fund.

1.5) Location(s) of hatchery and associated facilities.

Garrison Springs Hatchery: This facility is located on the grounds of Western State Hospital in Steilacoom, Washington. The physical address is 9601 Steilacoom Blvd., Drawer A, Tacoma, Wa. 98498. Garrison is located in close proximity to Chambers Creek (less than 0.5 miles).

Chambers Creek trap/pond: Located at RM 0.5 (WRIA 12.0007)

Lake Steilacoom: Located at RM 5.5

1.6) Type of program.

Isolated Harvest

1.7) Purpose (Goal) of program.

Augmentation.

The goal of this program is to provide adult fish for harvest opportunity.

1.8) Justification for the program.

This program will be operated in a manner which will not negatively effect listed fish by releasing fish as smolts as programmed in the Future Brood Document (FBD). These fish are 100% mass-marked (adipose-fin clip only) which will allow for selective fisheries (harvest opportunity) in mixed stock areas to minimize impacts on weak or protected stocks as well as identifying the hatchery fall chinook production and the NOR's.

1.9) List of program "Performance Standards".

1.10) List of program "Performance Indicators", designated by "benefits" and "risks."

Performance Standards and Indicators for Puget Sound **Isolated Harvest** Chinook programs.

Performance Standard	Performance Indicator	Monitoring and Evaluation Plan
Produce adult fish for harvest	Survival and contribution rates	Monitor catch and cwt data
Meet hatchery production goals	Number of juvenile fish released - **850,000**	Future Brood Document (FBD) and hatchery records
Manage for adequate escapement where applicable	Hatchery return rates	Hatchery return records

Minimize interactions with listed fish through proper broodstock management and mass marking. Maximize hatchery adult capture effectiveness. Use only hatchery fish	Number of broodstock collected - **870 adults**	Rack counts and CWT data Spawning guidelines
	Stray Rates	
	Sex ratios	Hatchery records
	Age structure	
	Timing of adult collection/spawning - **August to October**	Spawning guidelines Hatchery records
	Adherence to spawning guidelines - **1:1 with 5 fish pools**	
	Total number of wild adults passed upstream- **Beginning in 2001 no fish passed upstream**	
Minimize interactions with listed fish through proper rearing and release strategies	Juveniles released as smolts	FBD and hatchery records
	Out-migration timing of listed fish / hatchery fish **/ May**	FBD and historic natural outmigration times FBD and hatchery records
	Size and time of release **50 fpp/late April to May**	CWT data and hatchery records (marked vs unmarked)
Maintain stock integrity and genetic diversity	Effective population size	Spawning guidelines
	Hatchery-Origin Recruit spawners	

Maximize in-hatchery survival of broodstock and their progeny; and Limit the impact of pathogens associated with hatchery stocks, on listed fish	Fish pathologists will monitor the health of hatchery stocks on a monthly basis and recommend preventative actions / strategies to maintain fish health	Co-Managers Disease Policy Fish Health Monitoring Records
	Fish pathologists will diagnose fish health problems and minimize their impact	
	Vaccines will be administered when appropriate to protect fish health	
	A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings	
	Fish health staff will present workshops on fish health issues to provide continuing education to hatchery staff.	
Ensure hatchery operations comply with state and federal water quality standards through proper environmental monitoring	NPDES compliance	Monthly NPDES records

1.11) Expected size of program.

1.11.1) Proposed annual broodstock collection level (maximum number of adult fish).

To cover programs at Garrison, Chambers Creek and Lakewood will require an eggtake of 1,350,000 green eggs (assumes a 15.0% green egg to smolt mortality). Fecundity average is 4,200 eggs per female. The average sex ratio is 40% females and 60% males. Average adult mortality is 7.0%. Total broodstock required would be 870 (350 females

and 520 males).

1.11.2) Proposed annual fish release levels (maximum number) by life stage and location. (*Use standardized life stage definitions by species presented in* Attachment 2).

Life Stage	Release Location	Annual Release Level
Eyed Eggs		
Unfed Fry		
Fry		
Fingerling	Chambers Trap (RM 0.5) Lk. Steilacoom (RM 5.5)	600,000 250,000
Yearling		

1.12) Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.

Survival (Based on 7 years of coded-wire tag data)

Broodyear	% Smolt to Adult Survival
1979	0.90
1980	0.04
1981	1.20
1987	0.10
1989	0.33
1990	1.04
1991	0.02

There has been no set upstream escapement for fall chinook in Chambers Creek. Surplus fish have been passed upstream on a limited basis and not in any normal sex ratio appropriate for maintenance of a natural spawning stock. This system has been managed for a terminal harvest of fall chinook with enough escapement to meet program goals.

Broodstock levels back to the hatchery rack for brood years 1995 through 2001 were 1,490, 1,670, 1,472, 1,592, 773, 892, and 1,045, respectively.

1.13) Date program started (years in operation), or is expected to start.

1976.

1.14) Expected duration of program.

Ongoing.

1.15) Watersheds targeted by program.

Chambers Creek (WRIA 12.0007)

1.16) Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

This program is limited by the amount of rearing space available at the release location. The program is using the resources (Garrison and Chambers Creek trap) to meet the production potential at this time.

SECTION 2. PROGRAM EFFECTS ON ESA-LISTED SALMONID POPULATIONS.

2.1) List all ESA permits or authorizations in hand for the hatchery program.

None.

2.2) Provide descriptions, status, and projected take actions and levels for ESA-listed natural populations in the target area.

2.2.1) Description of ESA-listed salmonid population(s) affected by the program.

- Identify the ESA-listed population(s) that will be directly affected by the program.

None.

There are no ESA-listed natural salmonid populations in the program target area (Chambers Creek). In this watershed, adult chinook returns and any resulting natural production are dependent upon local hatchery program production. The available habitat is not judged to be typical, productive fall chinook habitat and would not likely support a self-sustaining, naturally spawning fall chinook population. If the local hatchery

production program was terminated, it is expected that natural chinook production in this watershed would eventually disappear. These opinions could be tested by identifying all hatchery fall chinook production in this watershed and monitoring natural production/productivity.

- Identify the ESA-listed population(s) that may be <u>incidentally</u> affected by the program.

Duwamish/Green Summer/Fall Chinook, Puyallup Fall Chinook, Nisqually Summer/Fall Chinook, South Sound Tribs Summer/Fall Chinook.

Nisqually River Summer/Fall Chinook. Stock-specific spawning ground, juvenile life history, survival and productivity data are generally lacking for this natural population. The population is presumed to be similar in biological characteristics to the other South Puget Sound fall chinook populations (Puyallup River and Green River fall chinook). Adults are presumed to be predominantly 4-year-olds at return (likely 60-80%), with smaller components of 2-year-olds (<10%), 3-year-olds (10-20%), 5-year-olds (5-10%) and 6-year-olds (<1%). Size at age is expected to be similar to the data listed below for Puyallup and Green River fall chinook.

Chinook spawning habitat in the mainstem Nisqually River is available from river mile 3 to just above the mouth of the Mashel River (approximately river mile 40). Chinook have been documented spawning in the accessible reaches of the Mashel River and Ohop Creek. There is occasional chinook utilization of 25 Mile Creek, a tributary to Ohop Lake.

River entry of mature adults begins in July and extends through September. Spawning occurs from early September through October. Most Nisqually River fall chinook juveniles likely migrate to salt water as zero age smolts after only a few months of freshwater residence. If migration timing is similar to Green River stock, the outmigration likely peaks in May. After several weeks of estuarine acclimation and feeding, the juveniles move off to feeding grounds in Puget Sound and the Pacific Ocean.

Duwamish/Green River Summer/Fall Chinook. The mean ratio of chinook carcasses sampled on the Green River spawning grounds in return years 1988 through 1997 was 5.5% age 2, 19.1% age 3, 64.4% age 4, 10.9% age 5 and 0.1% age 6. The adult sex ratio of sampled carcasses in 1999 was 52% male and 48% female. At age 3,4,5 and 6, adults average 60 to 80 cm., 80 to 95 cm., 85 to 100 cm. and 95 to 105 cm., respectively.

Most naturally-spawned Green River chinook migrate to saltwater after spending only a few months in freshwater. Arrival of both hatchery and naturally-produced smolts peaks in May and, after a few weeks, most begin moving to nearshore feeding grounds in Puget Sound and the Pacific Ocean. Sexually mature fish begin arriving back at the river mouth as early as July. The upstream migration peaks in late August to mid-September. Spawning begins in early September, peaks in October and is generally complete by early November.

Adults spawn in the mainstem Green River from approximately river mile 25.4 in Kent to the City of Tacoma diversion dam at river mile 61. Approximately 70% of natural spawning occurs upriver from the mouth of Soos Creek (river mile 33.7). Tributary spawning occurs in the lower four miles of both Soos and Newaukum Creeks.

Puyallup River Fall Chinook. The mean ratio of chinook carcasses sampled on South Prairie Creek spawning grounds in return years 1993 through 1997 was 0.9% age 2, 14.6% age 3, 75.0% age 4, 9.5% age 5 and 0.1% age 6. The sex ratio of sampled carcasses in 1999 was 50.2% male and 49.8% female. In return years 1992 through 1997, age 3,4,5 and 6 adults averaged 71.6 cm., 83.0 cm., 89.9 cm. and 104 cm., respectively.

Most naturally-spawned Puyallup River chinook migrate to saltwater as zero age smolts after spending only a few months in freshwater. Only 1.2% of Puyallup River fall chinook scale samples from return years 1992 through 1997 exhibited a yearling life history pattern. Outmigration timing is not currently well defined, but a study was initiated in 2000 to determine juvenile production levels and migration timing. After a few weeks of estuarine acclimation, most juveniles begin moving to nearshore feeding grounds in Puget Sound and the Pacific Ocean. Sexually mature fish begin arriving back at the river mouth in late July and continue to enter the river until mid-October. The upstream migration peaks in late August to mid-September. Spawning begins in early September, peaks in early October and is generally complete by November.

Adults spawn in the mainstem Puyallup River from approximately river mile 10.4 upstream to the anadromous barrier at Puget Sound Energy's Electron diversion facility (river mile 41.7). Fall chinook spawning habitat is available in the Carbon River from its mouth up into Mt. Rainier National Park. Tributary spawning takes place in Clarks Creek, Fennel Creek, Canyon Falls Creek, South Prairie Creek, Wilkeson Creek and Kapowsin Creek. An estimated 75% of the1999 Puyallup River fall chinook spawning took place in the South Prairie Creek system. Additional chinook spawning and rearing habitat is now accessable with the completion of a passage facility at the Electron diversion dam.

South Sound Tributary Summer/Fall Chinook. Stock-specific spawning ground, juvenile life history, survival and productivity data are generally lacking for this natural population. The population is presumed to be similar in biological characteristics to the other south Puget Sound fall chinook populations (Puyallup River and Green River fall chinook), since it is thought to be dependent on ongoing hatchery production (strays) in south Puget Sound. SASSI defines this stock as naturally spawning chinook in a number of widely distributed rivers, including McAllister Creek, Grovers Creek, Gorst Creek, Chambers Creek, Carr Inlet tributaries, the Deschutes River and other small streams in south Puget Sound.

2.2.2) Status of ESA-listed salmonid population(s) affected by the program.

- Describe the status of the listed natural population(s) relative to "critical" and "viable" population thresholds

Critical and viable population thresholds under ESA have not been determined, however, the SASSI report determined that status of the South Sound Tributary Summer/Fall Chinook, Duwamish/Green Summer/Fall Chinook and Nisqually Summer/Fall Chinook stocks are "healthy" while Puyallup Fall Chinook stocks are "unknown".

- Provide the most recent 12 year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population. Indicate the source of these data.

Not known.

- Provide the most recent 12 year (e.g. 1988-1999) annual spawning abundance estimates, or any other abundance information. Indicate the source of these data.

Estimates of fall chinook spawning naturally in the Nisqually River:

Year	Spawning numbers
1988	1342
1989	2332
1990	994
1991	953
1992	106
1993	1655
1994	1730

1995	817
1996	606
1997	340
1998	834
1999	1399

Estimates of fall chinook spawning naturally in the Green River basin:

Year	Spawning numbers
1988	7994
1989	11512
1990	7035
1991	10548
1992	5267
1993	2476
1994	4078
1995	7939
1996	6026
1997	9967
1998	7312
1999	11025

Estimates of Puyallup River fall chinook spawning naturally in the South Prairie Creek sub-basin[1]:

Year	Spawning numbers
1994	798
1995	1335
1996	1225
1997	622
1998	1028
1999	1422

[1.] Note that the historic Puyallup River fall chinook escapement estimates listed in Run Reconstruction are not considered accurate by the co-managers and are not relative to estimates made by a new method, beginning in 1999. The South Prairie Creek sub-basin has been chosen as an indicator of Puyallup River escapement, with a local spawning objective of 500 adults.

Estimates of fall chinook spawning naturally in South Sound Tributaries:

Year	Spawning numbers
1988	4257
1989	4979
1990	15814
1991	3681
1992	3610
1993	2998
1994	4950
1995	7456
1996	14931
1997	4192
1998	6372
1999	11028

- Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.

Nisqually River fall chinook - Unknown. There are inadequate spawning ground sampling data to estimate proportions.

Green River fall chinook - The ratio of Soos Creek hatchery-origin adults in mainstem Green River natural spawners averaged 33.4% in seven years between 1989 and 1997 (WDFW coded-wire-tag recovery data). Small sample sizes (<4%) in five of those years and the limited area sampled (river mile 33.8 to 41.4) make this data less than reliable when applied to the entire river.

The ratio of Soos Creek Hatchery-origin adults in Newaukum Creek natural spawners averaged 23.3% in nine years between 1989 and 1997 (WDFW coded-wire-tag recovery and scale data). Sampling rates averaged 30% for those years.

Puyallup River fall chinook - Unknown. There has been limited identification of hatchery-origin fish in this basin until the 1997 brood. Ratios will be developed when these fish mature and return to spawn.

South Sound Tributaries fall chinook - Unknown, although SASSI states that stock status is dependent upon local hatchery production.

2.2.3) Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of listed fish in the target area, and provide estimated annual levels of take

- Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the takes may occur, the risk potential for their occurrence, and the likely effects of the take.

Juvenile (fingerling) releases migrating to the nearshore areas of Puget Sound in the spring.

- Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.

Not known.

-Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).

Unknown (see "take" table at end of HGMP).

- Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.

None at this time.

SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

3.1) Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the NPPC *Annual Production Review* Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

There are no applicable plans or policies.

3.2) List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

Puget Sound Salmon Management Plan.

3.3) Relationship to harvest objectives.

3.3.1) Describe fisheries benefitting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

The following mean contribution rates, by fishery, for Chambers Creek fall chinook fingerling production are based on ten coded-wire tagged releases of 1989 through 1991 brood production.

Chambers Creek fall chinook fingerling releases:

Fishery	Mean Contribution Rate (Catch/fingerling released)
Alaskan Fisheries	0.0007%
Canadian Fisheries	0.0279%
Oregon Fisheries	0.0006%
WA Treaty Troll	0.0073%
WA Non-treaty Troll	0.0004%
PS Net	0.0527%
PS Sport	0.0834%
Total Fishery Contribution	0.1730%

This mean contribution rate would estimate a total fishery contribution of 1,470 fish from the current programmed release of 850,000 fingerlings. The mean harvest rates for these coded-wire tag releases was 56.0% for all fisheries and 50.1% for Washington fisheries, alone. The Fishery Regulation Assessment Model (FRAM) predicts a total 2000 fishery exploitation rate on Chambers Creek fall chinook (composite stock of fingerling and yearling production) to be 91%, including a total Washington fishery exploitation rate of 84% (FRAM run #0800, run with final 2000 regulation package).

3.4) Relationship to habitat protection and recovery strategies.

Habitat protection and restoration efforts in this watershed are primarily focused on improving passage, spawning and rearing conditions for the local coho, cutthroat and chum populations. There are minimal opportunities to increase natural chinook productivity in this watershed through habitat management initiatives.

3.5) Ecological interactions.

Predation/competition on listed fish by the fingerling fall chinook program at Chambers Creek are low/unknown at this time (Risk Assessment, WDFW, 2000).

Increasing pinniped populations in Puget Sound may be negatively affecting survival of this program's production.

SECTION 4. WATER SOURCE

4.1) Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile, and natural limitations to production attributable to the water source.

This program relies on two separate rearing locations to accomplish its goals and objectives. The spring fed water source at Garrison Springs can range from 2,000 gallons per minute (gpm) to 3,500 gpm depending on time of year and has a fairly constant temperature profile ranging from 53 to 57 degrees Fahrenheit. Initial rearing and grow out is accomplished at Garrison. Fish are transferred to the surface water fed Chambers trap pond for final grow out and release or planted directly into Lake Steilacoom (RM 5.5).

4.2) Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

All intakes are screened. No known natural production takes place above the intakes.

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

The Chambers Creek trap is at RM 0.4. A low head dam exists at this site with a fish ladder that allows for upstream and downstream passage during the months of March through July. The fish ladder is closed off from August through February and fish must

enter the trap holding area to be passed upstream or used for broodstock. Chinook are processed from August through October. The trap holding pond is 3,400 cubic feet with a maximum flow of 1,500 gpm. Fish are collected over the entire run timing and spawned accordingly.

5.2) Fish transportation equipment (description of pen, tank truck, or container used).

1. 400 gallon fry tank with aerator and oxygen
2. 900 gallon tanker with aerator and oxygen
3. 1,000 gallon tanker with aerator and oxygen

5.3) Broodstock holding and spawning facilities.

See section 5.1.

5.4) Incubation facilities.

Eggs incubated at Garrison Springs use freestlye and vertical incubators to eye-up. For final incubation (hatching) vertical incubators are used. Incubators are loaded at 6,500 eggs per tray with the top tray of the 8 tray stack used as a filter for large debris. Water flow per stack is 3.2 (gpm). Vexar is used as a substrate. Twenty stacks of incubators are on site located inside a standard pond. Water is fed to makeshift head boxes by header pipes at the front of the pond. Barrell incubators are also used in the ponds to complete the system. These incubators are loaded at 125,000/barrell and are used to hatch fry directly into standard ponds. Freestyle incubators are also used to bulk eye chinook. The loading density is 350,000 eggs per incubator.

5.5) Rearing facilities.

Garrison
8 raceways at 3,000 cubic feet (10' X 100' X 3') per vessel.(one raceway is used for incubation)
1 dirt pond at 9,400 cubic feet.

Chambers trap
3 raceways totaling 3,400 cubic feet.

5.6) Acclimation/release facilities.

See sections 5.1 and 5.5.

5.7) Describe operational difficulties or disasters that led to significant fish mortality.

None identified.

5.8) Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.

Intake is gravity feed, however, each bank of ponds and each incubation head box has a float alarm. Facilities are inspected and maintained daily, a stand-by person is on call 24 hours per day to answer alarms.

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

Describe the origin and identity of broodstock used in the program, its ESA-listing status, annual collection goals, and relationship to wild fish of the same species/population.

6.1) Source.

Fall chinook returning to the Chambers Creek trap.

6.2) Supporting information.

6.2.1) History.

Between 1972 and 1980 four stocks, or combinations of stocks, were used to support the Garrison program: Minter Creek, Rivers' Inlet x Deschutes, Portage Bay (UW), Voights Creek and Voights Creek x Deschutes.

Between 1980 and 1990 seven stocks, or combinations of stocks, were used including Green River x Issaquah, Portage Bay (UW), Big Soos Creek, Samish, Deschutes and Garrison.

From 1990 to the present, the predominate stock that is used is the adult fish returning to the Chambers Creek trap. Planting records list this stock as Garrison, in several years, and then changed to Chambers Creek in more recent years.

6.2.2) Annual size.

870 adults.

6.2.3) Past and proposed level of natural fish in broodstock.

Not known. WDFW shall continue to use gametes procured from fall chinook salmon adults volunteering to the Chambers Creek trap to effect this program. The intent is to collect localized hatchery-origin broodstock at this location.

6.2.4) Genetic or ecological differences.

Unknown

6.2.5) Reasons for choosing.

Locally adapted stock (South Sound).

6.3) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.

Adults will be hatchery-origin marked fish (2003/2004).

SECTION 7. BROODSTOCK COLLECTION

7.1) Life-history stage to be collected (adults, eggs, or juveniles).

Adult

7.2) Collection or sampling design.

Collection method is by fish trap. The fish trap is located at a diversion dam which effectively blocks fish passage. This allows us to trap 100% of all fish moving upstream while the fish ladder is screened off. The trap is in the fishing mode during the months of August through Febuaury. Broodstock are collected and spawned in the months of August through October (See section 5.1).

7.3) Identity.

All hatchery-origin adult fall chinook are 100% mass-marked (first broodyear marked was 1998).

7.4) Proposed number to be collected:

7.4.1) Program goal (assuming 1:1 sex ratio for adults):

870 adults

7.4.2) Broodstock collection levels for the last twelve years (e.g. 1988-99), or for most recent years available:

Year	Adults			Eggs	Juveniles
	Females	Males	Jacks		
1988					
1989					
1990					
1991					
1992					
1993					
1994					
1995	321	276	5	1,284,000	
1996	400	301	69	1,529,000	
1997	194	244	17	727,500	
1998	603	683	14	2,534,810	
1999	278	241		1,249,000	
2000	123	127		703,600	
2001	163	206	1	641,700	

7.5) Disposition of hatchery-origin fish collected in surplus of broodstock needs.

There is no established upstream escapement goal for fall chinook on Chambers Creek, as

the natural production potential of this creek is presumed to be limited. Beginning with the 2001 return, no surplus chinook will be passed above the rack.. If fish still remain after all spawning goals are achieved then they are supplied to nutrient enhancement programs, donated to food banks, buried, sent to a rendering plant or may be surplussed to the state contracted carcass buyer.

7.6) Fish transportation and holding methods.

Fish are held in the trap/pond until ripe. No treatments are used on the adults spawned for the sub-yearling program.

7.7) Describe fish health maintenance and sanitation procedures applied.

Standard disinfection and fish health procedures are followed for maintaining broodstock health as per the Co-Managers Fish Health Policy (1998).

7.8) Disposition of carcasses.

Fish carcasses are disposed of through a contract buyer, buried, supplied to nutrient enhancement programs or sent to a rendering plant. Unspawned carcasses may be donated to food banks.

7.9) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

Adult broodstock collected for the program will be hatchery-origin marked fish (2003/2004).

SECTION 8. MATING

Describe fish mating procedures that will be used, including those applied to meet performance indicators identified previously.

8.1) Selection method.

Spawners are selected randomly from the pond, checked for ripeness, processed or returned to the pond as green. Spawning occurs, on average, two days per week. Spawning runs from late September to late October. The peak of spawning is in mid-October. Spawning guidelines are followed as per Seidel (1983).

8.2) Males.

Males are spawned at a rate of one male per one female. 3 jacks per 100 males are used randomly in the spawning population.

8.3) Fertilization.

All gametes are transported on ice to the incubation site at Garrison Springs**.** Eggs are fertilized using one bag of milt (5 males) for 5 females (five fish pool).

Sanitation and fish health is maintained by using iodophore during the water hardening process and for clean up. This product is used in accordance with the WDFW Fish Health Manual (1996). Personnel working at multiple sites are required to disinfect raingear and boots prior to working in a new water source.

8.4) Cryopreserved gametes.

Not applicable.

8.5) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.

Adult collected for the mating scheme will be hatchery-origin marked fish (2003/2004).

SECTION 9. INCUBATION AND REARING -

Specify any management *goals* (e.g. "egg to smolt survival") that the hatchery is currently operating under for the hatchery stock in the appropriate sections below. Provide data on the success of meeting the desired hatchery goals.

9.1) Incubation:

9.1.1) Number of eggs taken and survival rates to eye-up and/or ponding.

Year	% Survival To Ponding
1988	80.0
1989	57.0
1990	82.0
1991	80.0
1992	59.0
1993	72.0
1994	86.0
1995	62.0
1996	42.0
1997	94.0
1998	94.0
1999	82.0

9.1. 2) Cause for, and disposition of surplus egg takes.

Egg take surpluses to program goals were the result of better than expected egg/fry survival and efforts to produce more fish for the program. Surplus fish were planted as fed or unfed fry into Lake Steilacoom. The present program is directed by the Future Brood Document (FBD) and the management of egg-take goals are designed to minimize egg surplus. Beginning with the 2000 brood, surplus fry will be released into landlocked lakes, only.

9.1.3) Loading densities applied during incubation.

Heath Techna vertical trays at Garrison Springs are loaded at 6,500 eggs per tray. The top tray, out of 8 in the stack, is used to filter large debris out. Flow is 3.2 gpm for each stack. Freestyle incubators are used to eye eggs in. Loading density for these incubators is 350,000 per unit. Barrel incubators are used to hatch out and pond fall chinook. Loading density for these units is 125,000 per barrel. Vexar netting is used as substrate for both the Heath Techna and barrel incubators.

9.1.4) Incubation conditions.

Incubators are monitored/cleaned daily, as needed, to prevent suffocation. Water quality is excellent and little debris enters the incubation system. Water temperatures are recorded daily to maintain Temperture Unit (TU) data to assist in identifying eye-up, hatch and ponding dates.

9.1.5) Ponding.

Fish are ponded at approximately 1,800 TU's. Ideally, fish are at least 70.0% buttoned-up and actively swimming up. A Condition (KD) factor of 1.95 is desirable. Ponding is not volitional. Fish are ponded between December 15 and January 30th.

9.1.6) Fish health maintenance and monitoring.

A daily formalin drip is used to control fungus on incubating eggs. Eggs are shocked at 550 TU's, picked by hand or salt-dipped to remove dead eggs. The eyed eggs are recounted and put down to hatch. After ponding fish are inspected by a fish health specialist on a monthly basis until release. Gills, skin, blood and internal organs are inspected for pathogens. The rearing program is reviewed, including fish density parameters, water flow, feeding program and fish loss. If loss is up and treatable pathogens are detected, prescriptions are given for treatment based on the pathologist review.

9.1.7) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.

9.2) <u>Rearing</u>:

9.2.1) Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1988-99), or for years dependable data are available.

Information provided from hatchery forms at Garrison Springs.

Year	% Survival (Fry to Release)
1988	98%

1989	98%
1990	89%
1991	90%
1992	94%
1993	97%
1994	
1995	89%
1996	80%
1997	98%
1998	86%
1999	93%

9.2.2) Density and loading criteria (goals and actual levels).

Goals (maximum at release)
5.0 pounds per gallons per minute (lbs/gpm) at release
0.75 pounds per cubic foot (lbs/cubic ft.) at release
0.2 Density index maximum at release

Actual
Goals have never been exceeded at this facility
Maximum levels have been
4.8 lbs./gpm at release
0.55 lbs./cubic ft. at release
<0.2 Density index at release

9.2.3) Fish rearing conditions

Fish rearing parameters such as loadings, flows, feeding levels and pond cleaning are accomplished weekly. Water temperatures are monitored daily and feed rates are adjusted accordingly. Temperatures range from 53 to 57 degrees Fahrenheit at both sites. Fish cultural operations are guided by the recommendations in the Fish Health Manual (1996).

9.2.4) Indicate biweekly or monthly fish growth information (*average program performance*), including length, weight, and condition factor data collected during rearing, if available.

Fish weights and lengths are recorded weekly. (For 1999 brood, one group)

Date	Length(mm)	Fish/lb.
12/14		1050
12/21	38	910
12/29	42	650
01/05	47	420
01/12	50	384
01/19	54	250
01/24	56	250
01/31	59	205
02/07	62	180
02/14	66	150
02/21	68	125
04/03	77	91
04/11	89	69

9.2.5) Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available.

1999 Brood Data

Month	Fish/LB.
1	910
2	205
3	
4	69

9.2.6) Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).

The following feed types are used for this program: Bio-Diet Starter #3, Bio-Diet Grower 1.0 mm, 1.5 mm, Moore-Clark Fry 2.0 mm. For the 1999 brood year, the total feed conversion was 0.85 to 1. Feeding rates ranged from 2.0% to 3.0% B.W/day.

9.2.7) Fish health monitoring, disease treatment, and sanitation procedures.

After ponding, fish are inspected by a fish health specialist on a monthly basis until release. Gills, skin, blood and internal organs are inspected for pathogens. The rearing program is reviewed, including fish density parameters, water flow, feeding program and fish loss. If loss is up and treatable pathogens are detected, prescriptions are given for treatment based on the pathologist review. Sanitation is conducted according to guidelines set out in the Fish Health Manual (1996).

9.2.8) Smolt development indices (e.g. gill ATPase activity), if applicable.

Not applicable.

9.2.9) Indicate the use of "natural" rearing methods as applied in the program.

250,000 are planted into Steilacoom Lake to rear and emigrate on their own.

9.2.10) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.

All fish under propagation are/will be from hatchery-origin marked adults.

SECTION 10. RELEASE

Describe fish release levels, and release practices applied through the hatchery program.

10.1) Proposed fish release levels.

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs				

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Unfed Fry				
Fry				
Fingerling	850,000	50	April-May	Chambers Creek
Yearling				

10.2) Specific location(s) of proposed release(s).

Stream, river, or watercourse: Chambers Creek (12.0007)
Release point: 600,000 (Tidewater RM 0.5)
250,000 (Steilacoom Lake RM 5.5)
Major watershed: Chambers Creek
Basin or Region: Puget Sound

10.3) Actual numbers and sizes of fish released by age class through the program.

Release year	Eggs/ Unfed Fry	Avg size	Fry	Avg size	Fingerling	Avg size	Yearling	Avg size
1988					837,899	40 fpp		
1989					947,140	43 fpp		
1990	48,600	1080 fpp			1,089,019	43 fpp		
1991	23,000	1000 fpp			1,230,600	125 fpp		
1992					978,960	35 fpp	28,510	9 fpp
1993					1,138,470	45 fpp	18,630	4 fpp
1994					735,720	33 fpp	24,620	5 fpp
1995			633,000	510 fpp	924,300	50 fpp	18,100	4 fpp
1996					870,745	72 fpp		
1997					455,740	59 fpp		
1998					865,236	67 fpp	88,651	6 fpp
1999					1,131,807	74 fpp	95,491	7.7 fpp
2000					840,128	54 fpp		

2001					646,435	59 fpp		
Average					906,586	57 fpp		

10.4) Actual dates of release and description of release protocols.

Release Year	Life Stage	Release Range	Release Type
1995	Fingerling	3/03 to 5/30	Forced
1996	Fingerling	4/04 to 5/16	Forced
1997	Fingerling	3/18 to 4/16	Forced
1998	Fingerling	3/03 to 5/30	Forced
1999	Fingerling	3/03 to 5/30	Forced

10.5) Fish transportation procedures, if applicable.

Fish are transferred from Garrison Springs to Chambers trap pond for 7 to 14 day acclimation period and then released into Chambers Creek. Fish are also planted directly into Steilacoom Lake. Transit time for all locations is less then 20 minutes. Fish densities are below 0.75 pounds per gallon of tank water. Fresh flow aerators and 3 liters per minute oxygen are used. Hauling temperature is 57^0 F.

10.6) Acclimation procedures.

Since Garrison Springs is on a spring fed water source and has no release outlet to Chambers Creek it is necessary to transfer fish to an acclimation location located on Chambers Creek. This site is at the Chambers trap pond (RM 0.5). They are also planted directly into Lake Steilacoom and allowed to migrate out on their own. Once fish are transferred to the acclimation site they are fed for 7 to 14 days and then released dependent on loading densities in the pond.

10.7) Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

Fish are 100% mass-marked (adipose-fin clip only) which will allow for selective fisheries (harvest opportunity) in mixed stock areas to minimize impacts on weak or

protected stocks as well as identifying the hatchery fall chinook production and the NOR's.

10.8) Disposition plans for fish identified at the time of release as surplus to programmed or approved levels.

Fish surplus to hatchery program are planted as unfed fry or fingerlings into landlocked lakes.

10.9) Fish health certification procedures applied pre-release.

A fish health specialists inspects the population for pathogens before release and gives the okay to release..

10.10) Emergency release procedures in response to flooding or water system failure.

Fish are maintained on site or may be transferred to appropriate sites within watershed or Fish Health Management Zone to prevent fish loss or early release. If no site is available, then fish may be released into Chambers Creek as a last resort to prevent fish loss.

10.11) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

All hatchery-origin fish released are mass marked. Limiting juvenile production and releases to current (proposed) levels will help retain, and not forestall, potential future options for the recovery of the listed chinook ESU.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

11.1) Monitoring and evaluation of "Performance Indicators" presented in Section 1.10.

Note: See section 1.10 for Monitoring and Evaluation. The purpose of a monitoring program is to identify and evaluate the benefits and risks which may derive from the hatchery program. The monitoring program is designed to answer questions of whether

the hatchery is providing the benefits intended, while also minimizing or eliminating the risks inherent in the program. A key tool in any monitoring program is having a mechanism to identify each hatchery production group.

Each production group shall be identified with distinct otolith marks, adipose clips, coded wire tags, blank wire tags or other identification methods as they become available, to allow for evaluation of each particular rearing and/or release strategy. This will allow for selective harvest on hatchery stocks when appropriate, monitoring of interactions of hatchery and wild fish wherever they co-mingle in riverine, estuarine and marine habitats and assessment of the status of the target population. WDFW shall monitor the Chinook salmon escapement into the target and non-target Chinook populations to estimate the number of tagged, un-tagged and marked fish escaping into the river each year and the stray rates of hatchery Chinook into the rivers.

11.1.1) Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

Refer to section 1.10.

WDFW shall apply an identifiable mark to 100% of the fall chinook salmon fingerlings released through the hatchery program each year to allow monitoring and evaluation of the program's releases and adult returns. WDFW also shall apply coded-wire tags to a portion of the sub-yearling production at Garrison Springs Hatchery to allow for evaluation of fishery contribution, survival rates and straying levels to other Puget Sound watersheds.

11.1.2) Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.

Funding and resources are currently committed to monitor and evaluate this program as detailed in the Resource Management Plan for Puget Sound Chinook Salmon Hatcheries (Washington Department of Fish and Wildlife and Puget Sound Treaty Tribes, August 23, 2002). No fish are passed upstream so no spawning surveys are planned.

11.2) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.

Monitoring and evaluation will be undertaken in a manner which does not result in an unauthorized take of listed chinook.

SECTION 12. RESEARCH

12.1) Objective or purpose.

12.2) Cooperating and funding agencies.

12.3) Principle investigator or project supervisor and staff.

12.4) Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.

12.5) Techniques: include capture methods, drugs, samples collected, tags applied.

12.6) Dates or time period in which research activity occurs.

12.7) Care and maintenance of live fish or eggs, holding duration, transport methods.

12.8) Expected type and effects of take and potential for injury or mortality.

12.9) Level of take of listed fish: number or range of fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "take table" (Table 1).

12.10) Alternative methods to achieve project objectives.

12.11) List species similar or related to the threatened species; provide number and causes of mortality related to this research project.

12.12) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury, or mortality to listed fish as a result of the proposed

research activities.

SECTION 13. ATTACHMENTS AND CITATIONS

Seidel, Paul. 1983. Spawning Guidelines for Washington Department of Fish and Wildlife Hatcheries. Washington Department of Fish and Wildlife, Olympia, Washington.

Washington Department of Fish and Wildlife and Western Washington Treaty Indian Tribes. 1998. Co-Managers of Washington Fish Health Policy. Fish Health Division, Hatcheries Program. Washington Department of Fish and Wildlife, Olympia, Washington.

Washington Department of Fish and Wildlife. 1996. Fish Health Manual. Hatcheries Program, Fish Health Division, Washington Department of Fish and Wildlife, Olympia, Washington.

Washington Department of Fish and Wildlife and Puget Sound Treaty Tribes, 2002, "Puget Sound Chinook Salmon Hatcheries, Resource Management Plan", a component of Comprehensive Chinook Salmon Management Plan, August 23, 2002. 103 pages.

SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

"I hereby certify that the foregoing information is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973."

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

Table 1. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: Chinook ESU/Population: Puget Sound Activity:Fingerling Chinook Program				
Location of hatchery activity: _Garrison Springs Dates of activity: _August to June_ Hatchery program operator: __Rich Eltrich_____				
Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)				
Collect for transport b)				
Capture, handle, and release c)				
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)			Unknown	
Intentional lethal take f)				
Unintentional lethal take g)	Unknown	Unknown	Unknown	
Other Take (specify) h)				

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.